Water Purification

BY

Electricity.

Water Purification

FOR

CITY AND TOWN SUPPLY.

BY

HENRY ROESKE, H. E.

914 Snyder Avenue.

Philadelphia, Pa.

U. S. A.

The Purification of Water.

The great variation in the quality of water and the higher and lower importance of the same for the different purposes render it impossible to state, without a knowledge of the circumstances surrounding a case, the measurement necessarily to be taken in order to render with **success and economy** an impure water fit for use.

It can be comprehended that water for steam generation should not contain mineral or metallic impurities from which incrustation of boilers is derived, while microbes do not hurt in such case; drinking water, on the other hand, should be **perfectly** free from the latter, but not necessarily from the former; the purest waters found on earth are generally those which have came down from Granite hills, but if a thousand of such streams are analyzed not one of the same will be found wholly free from some admixture; this indicates that it has not been ordained in the economy of nature to be best for men to receive water in a state termed "chemicaliy pure;" the development and nutritution of the bony structure of the human system requires small quantities of foreign substances in water, e. g. calcereous salts, etc.

If a water, however, contains more than:

A. 3 parts by weight of dry mineral matter in suspension in 100,000 parts of liquid.

B. 1 part by weight of dry organic matter in suspension in 100,000 parts of liquid.

c. 2 parts by weight of organic carbon or 3 parts of organic nitrogen in solution in 100,000 parts of liquid.

D. 2 parts by weight of any metal in solution in 100,000 parts of liquid, except calcium, magnesium, pot tassium, and sodium.

E. 0 5 parts in 100,000 parts by weight of metallic arsenic in solution, suspension, chemical combination or otherwise.

F. 1 part of free chlorim in every 100,000 parts by weight, after an addition of sulphuric acid;

G. 1 part of sulphur in the state of sulphretted hydrogen or a soluble sulphurette in every 100,000 parts by weight.

H. 0.5 parts of petroleum or hydro-carbon in suspension in every 100,000 parts.

I. Or having an alkalinity greater than that produced by adding one part by weight of caustic soda to 1,000 parts of distilled water.

K. Or having an acidity superior to that produced by adding two parts by weight of hydrochloric acid to 1,000 parts of distilled water.

It is to be termed "polluted water" unfit for domestic use.

The following is a simple semi-chemical test: Fill a clean pint bottle three-fourths full of the water; add a half teaspoonful of clean granulated or crushed loaf sugar; stop the bottle with glass or a clean cork and let it stand in the light in a moderately warm room for forty-eight hours. If the water becomes cloudy or milky it should be rejected.

The purification of water for industrial purposes for which a clear soft water is sufficient, has long ago reached the point from which it is justifiable to say that this forms no difficulty but can be accom-

plished under most all normal circumstances. In some cases plain subsisdence will answer the purpose, if not, a properly constructed sand filter will retain any solid matter that is visible to the naked eye, and if a water is impregnated with certain ingredients before reaching a filter, or if such ihgredients are mixed with the sand, the water will not only be freed from the solid impurities but also **to a certain extent** from such in solution. This is often contradicted, changes, however, nothing on the fact; the reader may convince himself in a few minutes by the following experiment: Take a glass of very clear water, which, however, has an odor proving the presence of impurities in solution and gaseous form, which have derived from decomposed vegetable matter, e. g., amonia, add so much *dyalized* iron to the water that it appears like, say so called white wine, and in a few moments it will be noticed that the soluted impurities combine with the iron and form a light floculent mass appearing like snow-flakes taking the course of descension; this is a slow process, a sand filter arrests the same instantaneously, returning the water to its former appearance. Various propositions for a water-purification plant have recently been referred to an **Expert** for investigation; the writer suggested in his proposition the use of this ingredient if it should be necessary; that **Expert** in his report of negative character to all propositions raised the question. What is Dyalized Iron? for those **Experts** who do not know, exclusively, the following explanation:

Dialized Iron (*Ferrum Dialysatum*) is a colloidal preparation; a mixture of basic ferric chloride and ammonium chloride is placed upon a septum; the crystalloids (ferric chloride and ammonium chloride) pass

with any free acid into the diffusate, leaving the neutral ceiloidal liquids upon the septum.

The fact that there are thousands of large purification plants in successful operation, and the progressing adoption of such contrivances, render sufficient proof for the assertion made before, namely, that the purification of water to such an extent that satisfies the reasonable demands of the industry, can be accomplished under almost any normal circumstances by competent persons; there is, however, much charlatanry appealing to ignorance, claiming bombastically to render with a few drops of alum and a handful of sand or a common porcelain tube, etc., thousands of gallons in less than no time, not only clear, soft and absolutely germ-proof, but to be also a curative for rheumatism, consumption, toothache, and other diseases, for which medical science has found no remedy yet; for those who suffer under such imperfect contrivances, the following copy of a testimony, and for others who contemplate to acquire a good reliable contrivance to improve their water-supply, the attached brief and rough illustration of various sizes and structures of filters. As mentioned in the preamble, it is impossible to state before hand what is necessary to do in order to combine **efficiency** and **economy;** I therefore solicit correspondence with informations; I will either judge from such informations, or examine personally the circumstances, and furnish without any expense to the contemplator perfect description of what I deem necessary to do to fully guarantee good results with as little cost as posssible*; and if I do undertake to guarantee satisfaction, the contemplator is never in any risk whatever, as I do not ask for compensation except the satisfaction is rendered.

PHILADELPHIA, December 17, 1890.

Mr. Henry Roeske has changed for us three water filters from the – (courtesy objects to mention name without provocation) to his own system. The capacity of the filters has been increased abou tone half by the change; they are more easily cleaned, and in all respects they are satisfactory.

THE DELAWARE SUGAR HOUSE,
George R. Bunker & Co.

The Purification of Water for Drinking

Purpose forms more difficulty. Science has established the fact that the germs of diseases are principally found in that large world of small animaculæ termed microbes, bacteria, etc., that it is, however, less the living animal which renders the danger but more the dead; when during their process of decomposition matters change into others, appears a poison termed "ptomaen." This to destroy forms the problem! It can be comprehended that the more animal life there is, the more dead and poison there must be and especiaily when many different specimens are mingled together. My appeal to intelligence seems to render it superfluons to go here into details in reference to what this or the other filter or chemical does; I can briefly and safely say, that neither filtration or chemical treatment, nor the both combined, extract or destroy said poison if it is in the water; contrarily, on the hand of ten years' experience in this special profession, I do not fear any contradiction from whatever side they may come, but positively make the assertion, that filtration in the hands of the public renders more poison instead of extracting or destroying it. It is not the filtration in itself what does it, but the carelessness of the people. It is unnecessary to investigate whether this or the other method of cleaning a filter is the best, because nine of ten persons do not do it, even not if it requires nothing more than only opening one valve and to keep

it open for a few minutes. They clean the marble steps and the pavement often twice a day the whole year around, the filter, however, ls placed in this or the other corner of a cellar, and it is only thought of when either the water smells or its flow is decreased. How are you protected, even if you have a filter in your home, and you are one of the few who form an exception and keep their filters in good order, and you drink water in your friends' house, or in restaurants who do not? Do not doubt the fact that the filters erected in industrial establishments where the microbe do not eat up much, receive as a general rule, better attention than in many private residences, hotels, and even in some hospitals, where they eat up life. If the reader is desirous to filter his drinking water, the annexed schedule will show that I am in that line of business, and that I am prepared to satisfy the smallest and the greatest demand. My filters are just as good as the next and reasonable in price.

I feel, however, not justified in inducing the public to this kind of water purification for the reasons given. I deem it proper that water should be purified by the water department of a community, in such a manner that the treatment bears partly the character of a **Preventative** and partly of a **Curative;** the value of one ounce of the first to a pound of the other is well known. Animal life is a product derived through insufficient decomposition of vegetable matter; therefore, if there is no such matter, animal life cannot come to existence, hence the first measurement to be taken is the prevention of the introduction of vegetables into a stream. Legislative power cannot command wind and the flow of rain water over land into streams. A bushel of sawdust, however, or a bucketful of morrocco refuse, which passes with the water through the pumps

into reservoirs, renders more danger than the biggest trunk of a tree floating in the river. The second step towards the solution of the problem on hand, should be the abolishing of the process of subsidence.

This proces is absolutely not a proper treatment of impure water. It is not a theory, but a well established fact, that **motion tends towards purification and not stagnation.** Subsidence is in universal use in this country ; this proves what has been stated, because the complaints about impure water are also universal. A remarkable fact can be noticed in Philadelphia : the water in the Schuylkill river above the so-called Flat Rock dam is considered to be better that that below said dam, for the reason it does not receive as much refuse from mills.

Those sections of the city termed Germantown, Chestnut Hill and Manayunk, are supplied with the better water ; before the water, however, reaches the consumers it undergoes a **purification process** by subsidence. Recently, in almost any show windows of Germantown stores could be read : "Step in and sign the petition for purer water." A committee of citizens appeared before Councils and furnished on hand of statistics in referrence to the mortality sufficient proof of the necessity for immediate sanitary measurements ; an other districts of Philadelphia is supplied with water by direct pumpage from the river below the dam referred to; with the exception of complaints about the appearance of the water after a heavy rain, etc., there is no excitement heard of , If this proves anything it is what has been said, that **stagnation disimproves a water.**

Contradictory arguments referring to that ancient people had subsiding reservoirs are weak. In former times when artificial forcement of water to evaporation

was of slight degree, air and water was more pure; artificial purification was of secondary value, the uncertainty of rainfall rendered the protection against danger of draught a greater necessity, hence the storage reservoirs in former times. Nature had at those times not disclosed so much as now ; it was, however, even then comprehended that stagnation of water is of disimproving tendency to whatever degree it may be in a single case, and, therefore, the storage reservoirs were built in a manner to keep the water cool, and that solar and lunar influences could not act rapidly enough to change the moderate good condition of the water into a dangerous before it came to consumption ; the reservoirs were built narrow and deep, and they were covered. The beneficial effects of air, solar and lunar influences on water was not misunderstood, contrarily, it was very well reckoned with; water was carred into towns in open conduits, in order to gain said effects, however, only while the water was in motion; the free oxygen in air entrapped by the motion, tends towards keeping the decomposition of solid matters inside of a limit, and whatever does turn into the state of solution is partly made harmless by the chemical change caused by mingling one substance with the other, and partly absorbed by oxygen and extracted by sun an moonlight: during subsidence it is reversed. Those who know, need no explanation ; those who do not, may notice the effect of sunlight on colored fabrics in show windows, and that of the moon in reference to the tides.

It is true that the appearance of water can be improved by subsidence; the appearance, it has been said before, is not the solution of the problem. Ever since steam power established an industry which forces millions of times as much water into circulation

through atmosphere and earth with all its consequences than in former times, it requires for common sense nothing but common sense to comprehend that the various kinds of solid impurities accumulating on the bottoms of reservoirs, covering generally a large area with but little depth, must dissolve to whatever degree it may be in the single case and force the impure gases into the distributing pipes. If from the standpoint of Purification the erection of subsidary basins should be abolished and be substituted by something better, reservoirs remain a necessity for other reasons. Even by a greater certainty of rainfall, the danger of a drought is not removed entirely, and they are also needed in case of great fires and for equal distribution, etc. In the following it is explained how it has been the object of study to accomplish a combination of storage and thorough purification with as little cost as possible.

The solution of the problem has been reached and consists, briefly stated, of the following :

The embankment of a reservoir is to be a sand filter through which the water percolates slowly according to what and how much of it it contains, approximately given say, at a rate of 300 gallons per day for each square foot of filtering surface ; the same is mixed with pieces of old iron, *e. g.* turnings, borings, filings, rivet punches, etc., this tends towards rapidly decomposing vegetable matter, thus preventing to a certain, but however uncertain degree, it is not the "iron" that causes the effect, but the hydrated oxide derived from the iron ; this is claimed by somebody else to be a new discovery, it is however old ; it has been in use in England long ago, and is here ; it was demonstrated *ad oculus* at the Novelties Exhibition of the Franklin Institute, in 1886, by the writer. What is of more importance

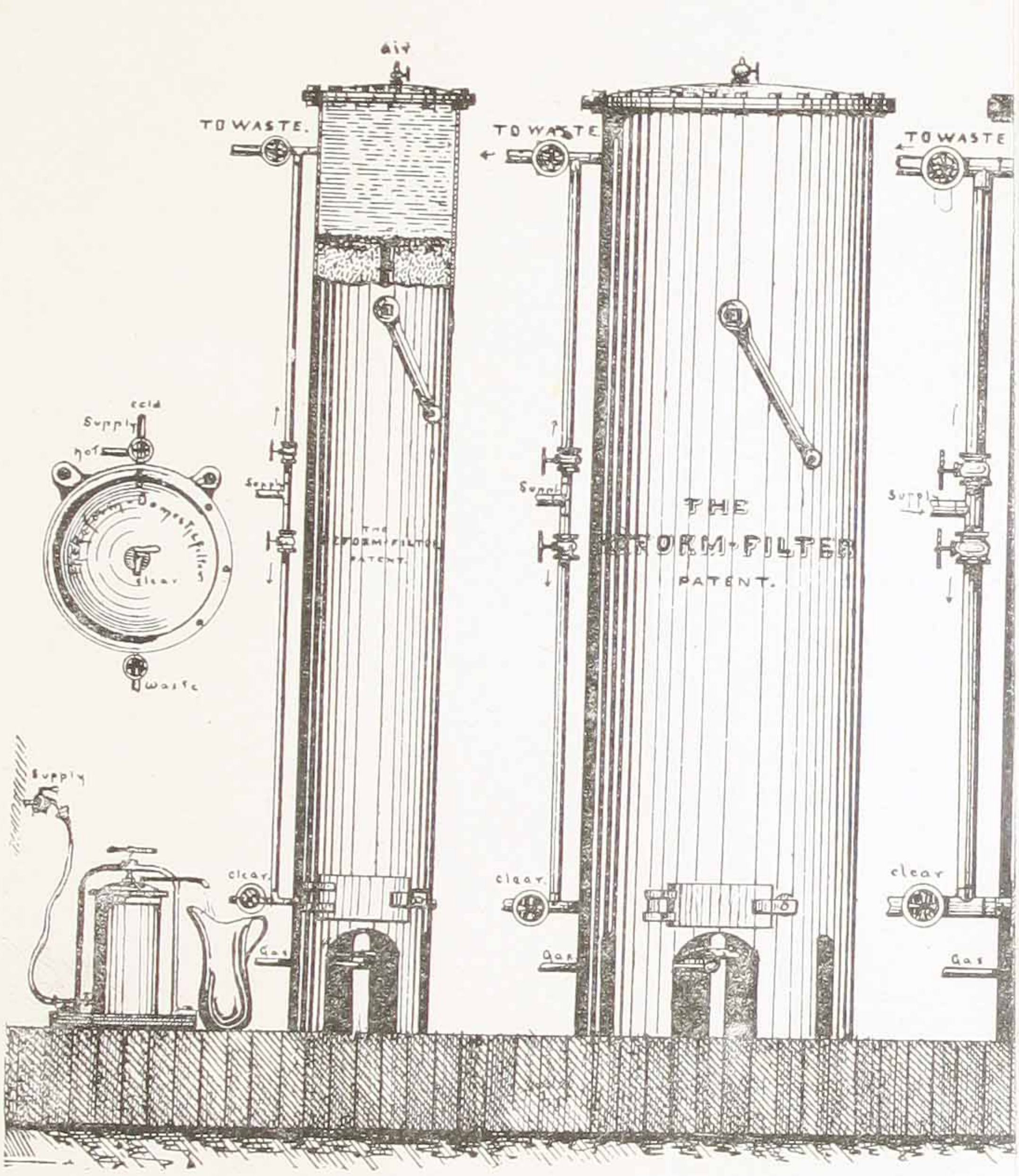
here, is that it is of efficiency: It can however be easily understood that the destruction of a certain amount of one matter requires a certain amount of the other; fluctuation of the quantities of the one matter in water is known, it can however, not be sufficiently observed, hence the impossibility of measurements which place correctness beyond doubt, or in other words, the process must be considered to be a good aid but not the perfect solution of the problem. Returning to the filtration, during the time the water percolates slowly through the interstices of the sand, currents of electricity are introduced changably to say, 15,000 times in a minute, while electric light is thrown on the water; this, our little friends cannot stand, they are totally destroyed and the formation of poison is **prevented** A machine has been constructed which enables to clean a filter plant for even the largest city, thoroughly every day, while the necessary electricity for its operation as well as for the purification purposes, can be generated on every reservoir, by pumping the water somewhat higher, and let it fall down on to a water wheel, thus rendering the whole combination of storage and thorough purification of water at a cost in the reach of every community. It is a ridiculous picture, found often, to see pumps with nickel-plated fancy fittings, boxed up in mahogany, pumping mud.

Correspondence solicited.

Respectfully,

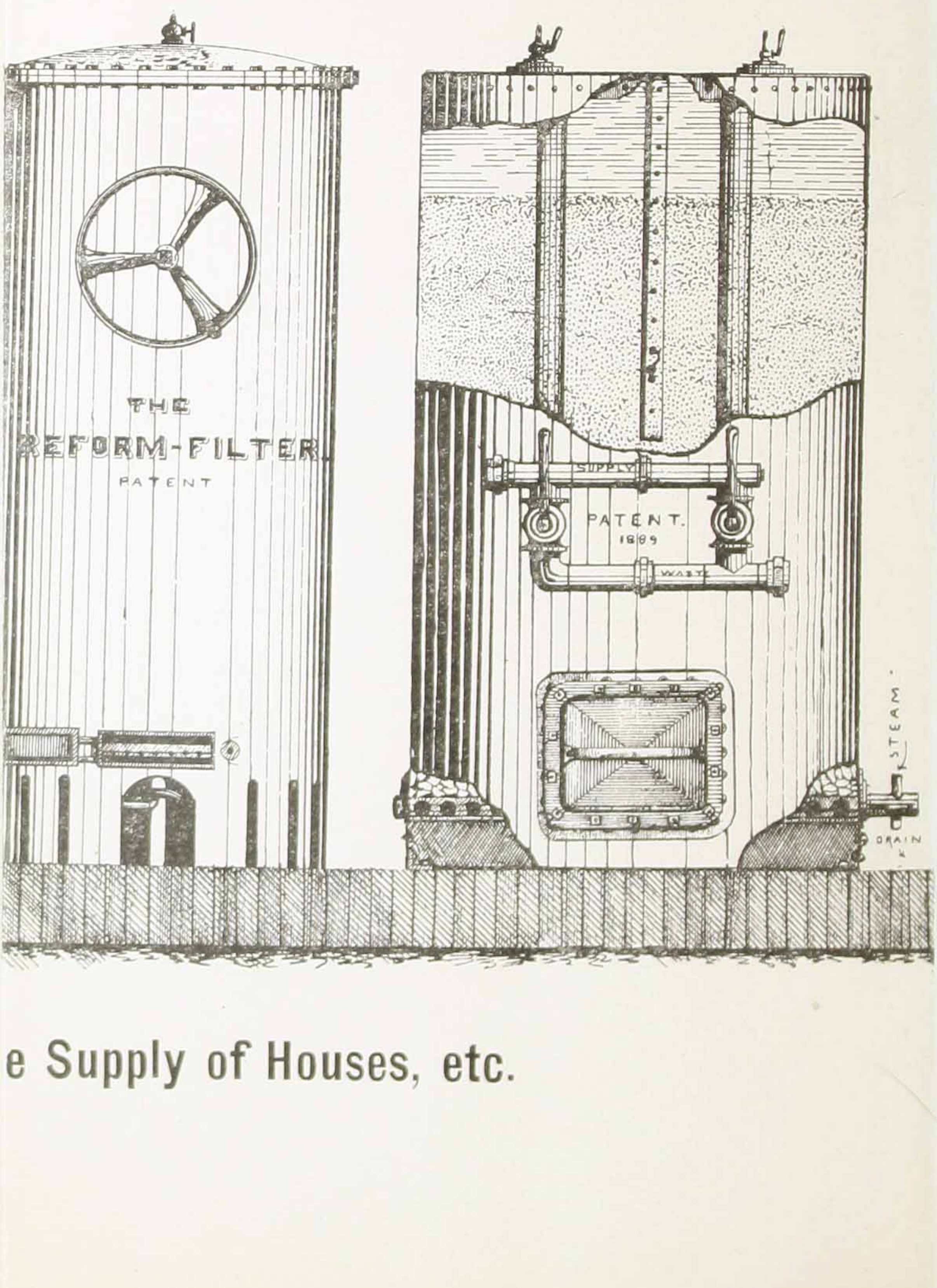
HENRY ROESKE, H. E.,

914 Snyder Avenue. Philadelphia, Pa.

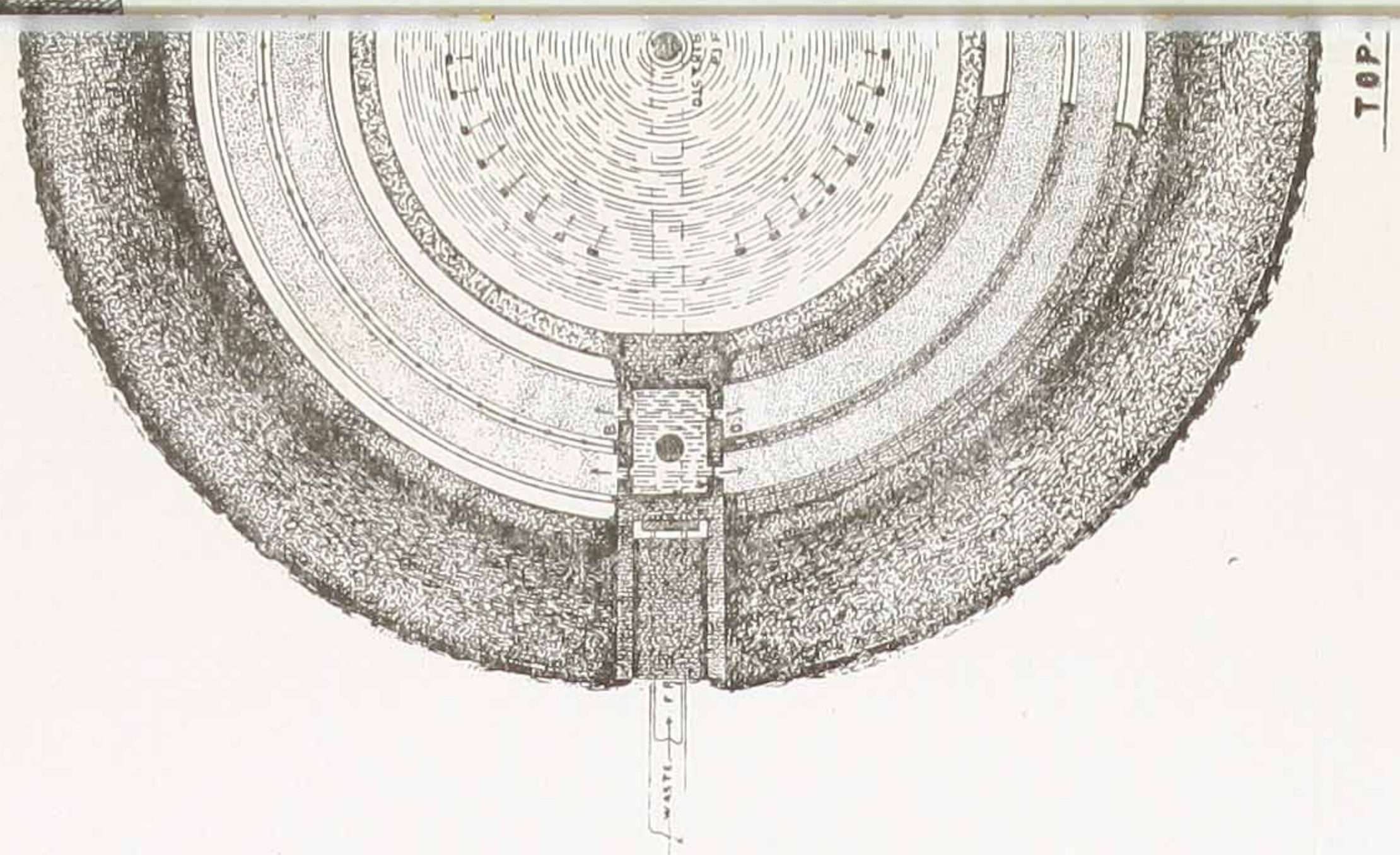


Portable Filters for Laboratories, etc.

Stationary Filters for th



e Supply of Houses, etc.



Filters for City and Town Supply.

e Supp